IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE COURT

AMPEX CORPORATION, *Plaintiff,* v. EASTMAN KODAK COMPANY, ALTEK CORPORATION, and CHINON INDUSTRIES, INC., *Defendants.*	C.A. No. 04-1373 (KAJ)

PATENT-IN-SUIT AND INTRINSIC EVIDENCE SUBMITTED WITH THE JOINT CLAIM CONSTRUCTION CHART

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TAB A

U 1167518

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

May 07, 2004

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF:

U.S. PATENT: *4,821,121*
ISSUE DATE: *April 11, 1989*

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

T. LAWRENCE
Certifying Officer

United States Patent [19]

Beaulier

[11] **Patent Number: 4,821,121**

[45] **Date of Patent: Apr. 11, 1989**

[54] **ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION**

[75] Inventor: **Daniel A. Beaulier, Menlo Park, Calif.**

[73] Assignee: **Ampex Corporation, Redwood City, Calif.**

[21] Appl. No.: **18,786**

[22] Filed: **Feb. 24, 1987**

Related U.S. Application Data

[63] Continuation of Ser. No. 740,297, May 31, 1985, abandoned, which is a continuation of Ser. No. 483,327, Apr. 8, 1983, abandoned.

[51] Int. Cl.[4] H04N 5/14

[52] U.S. Cl. 358/160; 358/183

[58] Field of Search 358/160, 183, 311, 342, 358/102; 360/35.1, 9.1, 10.1, 14.1

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,152,722	5/1979	Inuiya et al.	358/102
4,172,264	10/1979	Taylor et al.	358/185
4,302,776	11/1981	Taylor et al	358/160

FOREIGN PATENT DOCUMENTS

0051305	5/1982	European Pat. Off.	360/14.1

OTHER PUBLICATIONS

Hugh Boyd, "The DLS6000—A New Digital Still Store Library System", International Broadcast Engineer, vol. 11, No. 170, pp. 46–48.

Primary Examiner—Edward L. Coles, Sr.
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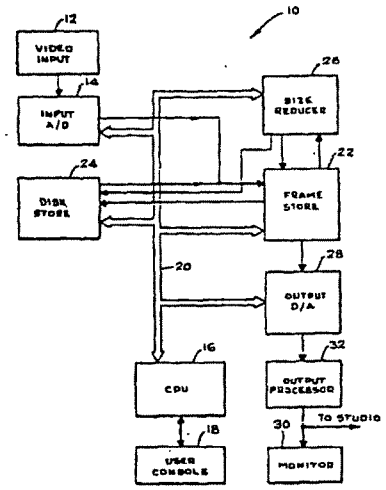
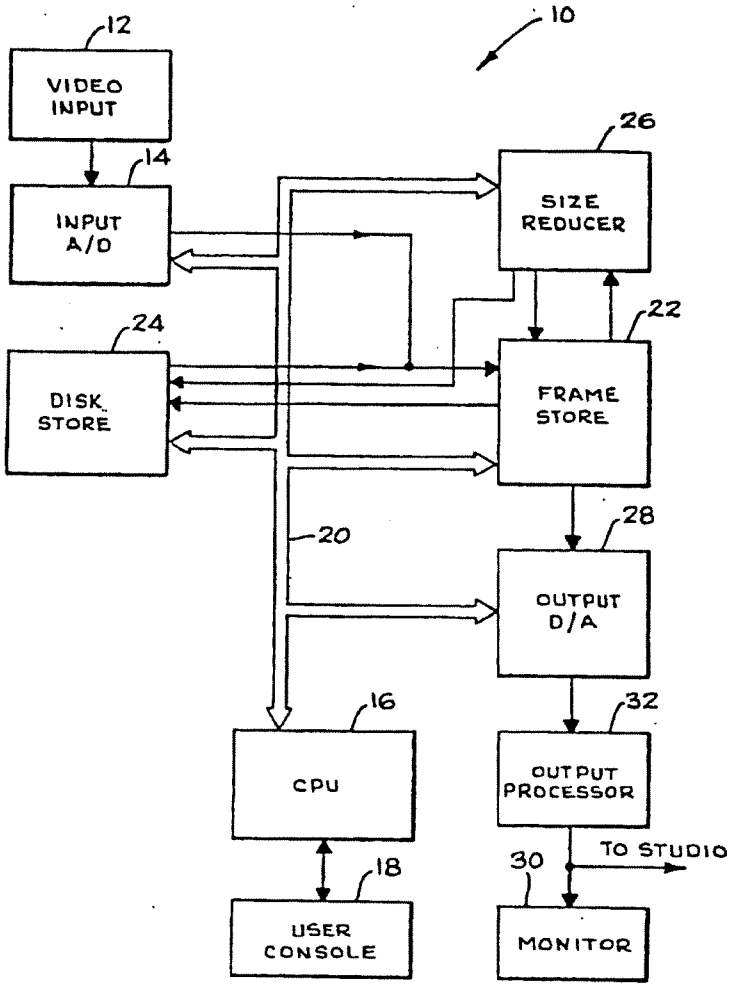
Attorney, Agent, or Firm—Bradley A. Perkins; Ronald C. Fish; George B. Almeida

[57] **ABSTRACT**

An electronic still store system stores and selectively outputs video image data defining a plurality of signal frame still images. The simultaneous display of up to 16 or more quarter sized images for scanning or sorting by an operator is facilitated by generating a quarter sized copy of each newly received image frame and storing both together on a conventional magnetic disk storage device as is typically employed in general purpose digital computing systems. The quarter sized image can then be recalled directly for a multi-image scan or sort function in which 16 reduced size images are displayed simultaneously without the time delays associated with the retrieval and size reduction of 16 full size images.

15 Claims, 1 Drawing Sheet





ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

This is a continuation of application Ser. No. 740,297, filed on May 31, 1985, now abandoned, which is a continuation of application Ser. No. 483,327, filed Apr. 8, 1983, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a digital electronic still store for broadcast television signals and more particularly to a still store providing a high speed multiimage scan or sort capability.

Digital electronic still store video display systems store a plurality of frames of video images on relatively low cost magnetic disk storage. Any selected one of the stored image frames may then be communicated to a frame store from which data defining the image is repetitively read out to generate a continuously displayed television image. The still store image can then be combined with a second image to create a combined video image. For example, it is common to insert a selected still store image depicting a news event in the upper left hand corner of a live studio image depicting a newscaster describing the news event.

The disk store is capable of storing a large library of single frame images and it is often desirable to generate a reduced size multiple image picture for editing or other purposes. For example, it might be desirable to create a special effect with multiple images or an editor may wish to view and compare several images at the same time for the purpose of selecting those images which will be used in a television broadcast. However, each of the several images which are to be simultaneously displayed must first be read from the disk store as full size images and then reduced for insertion into the multi-image display. This process takes ½ to ½ second for each image and results in a delay of several seconds for the composite multi-image display. Such a time delay is at best disconcerting for a busy editor and precludes use of the editing features of the system during a real time broadcast.

U.S. Pat. No. 4,172,264, "Control Arrangement for Video Synchronizers", to Taylor et al describes an arrangement in which joysticks may be used to selectively position video images on a television display. The system requires full sized images to be accessed and then reduced in size as described above.

U.S. Pat. No. 4,302,776, "Digital Still Picture Storage System With Size Change Facility", to Taylor et al discloses a still store system in which multiple images may be accessed and reduced in size for simultaneous display as discussed above. The suggestion is made that an array of reduced size images be stored as a single image frame. This has the effect of eliminating the time required to reproduce the array but precludes the flexibility of choosing or repositioning any desired images when recalling the array. Furthermore, the aforementioned time delays are encountered when assembling the original multi-image display.

SUMMARY OF THE INVENTION

An electronic still store system in accordance with the invention rapidly generates and outputs for display to an operator a still image frame comprising a plurality of selectively positioned, reduce size images which may be simultaneously viewed for scanning or editing purposes. The system includes an image store for storing therein a plurality of frames of video images with both a full spatial resolution copy for full size video output and a reduced spatial resolution copy for reduced size video output of each image being stored, and a frame store which is operable in a first mode to receive from the image store, store and repetitively generate a full spatial resolution output image frame. The frame store is operable in a second mode to receive from the image store and store a plurality of reduced spatial resolution image frames. The frame store is further operable in the second mode to repetitively generate an output image frame having an image from each of the plurality of reduced spatial resolution image frames selectively located at a different position within the output image frame.

The system may further include an image size reducer coupled to produce a quarter size reduced spatial resolution image in response to a full resolution image stored by the frame store, a video input, an analog-to-digital converter coupling the video input to the frame store, a monitor for viewing output video images and an output digital-to-analog converter coupled to convert the output video images from a digital form to an analog form for use by the monitor. A central processing unit is connected to receive user commands through a user console and to control the other devices of the system in response thereto.

The image store employed herein is a general purpose magnetic disk storage system as is currently used in general purpose digital computer systems.

In operation the system can rapidly assemble an array of 16 reduced size images for output as a single image frame. A system operator may view the reduced size images simultaneously for rapid scanning of some or all of the stored images within the image store, which is preferably a magnetic disk. Because the images are read from the image store in reduced size and spatial resolution, the output image formation time is approximately the ½ to ½ second required to transfer a single full size image instead of the several seconds which would be required to transfer 16 full size images prior to resolution reduction and storage as a reduced size image.

Using this system an operator may rapidly scan many still frame images which are stored by the image store or may compile lists of randomly selected image frames for simultaneous viewing as an array of reduced size images. Because of the rapid response rate the system becomes feasible for development and outputting of data frames containing multiple reduced size images on demand during a television broadcast.

BRIEF DESCRIPTION OF THE DRAWING

A better understanding of the invention may be had from a consideration of the following detailed description taken in conjunction with the accompanying drawing in which the sole FIGURE is a block diagram representation of an electronic still store system in accordance with the invention.

DETAILED DESCRIPTION

Referring now to the sole FIGURE, a digital electronic still store system 10 for rapidly assembling as a single image frame an array of reduced size images is shown as including a video input circuit 12. The video input circuit 12 may be another electronic still store system, a TV camera, or some other source of video data from which one or more frames of a video image

may be captured. In the preferred embodiment of the electronic still store system 10, the video signal is processed in component form. A method and apparatus for producing the component information which may be employed is more fully disclosed in the U.S. Pat. No. 4,675,876, issued Sept. 22, 1987 to D. Beaulier, which is assigned to the same assignee as this application, which is incorporated by reference herein. Therefore, the video input 12 will include appropriate video signal decoding means to process video data received from sources that provide the data in an encoded form.

An input analog-to-digital (A-D) converter 14 is coupled to receive an input video signal provided by the video input circuit 12, which typically includes video signal processing circuitry that prepares the signal for conversion by the A-D converter 14. The A-D converter 14 converts the input video signal to a digital form which is suitable for handling and processing by digital circuitry. The input AD 14 receives the video signal from the video input 12 and converts the video signal to the digital sampled data form in which each pixel of video data is represented by three eight bit data bytes defining respectively luminance, red chrominance and blue chrominance components. Conventionally, the chrominance data has half the spatial resolution of the luminance data in the horizontal dimension so that data is produced in a repetitive 4 byte luminance/chrominance component sequence of L1, CR1, CB1, L2—L3, CR3, CB3, L4 and so forth. The single byte representation affords a high dynamic resolution of 256 distinguishable states for each color component. For adequate dynamic resolution, each video component at a sampled data point is preferably defined by at least 6 binary bits providing 64 distinguishable intensities. A central processing unit (CPU) 16 formed from a Z80 microprocessor is connected to receive operator commands from a user console 18. CPU 16 is connected for bidirection communication of commands and other data over a system bus 20. The system bus 20 is connected to input A-D 14 as well as other major components of the still store system 10 to carry the address, mode select and status information required to control the operation of the still store system 10.

A frame store 22 which in the preferred embodiment is a random access memory, is coupled to receive mode control information from CPU 16 over system bus 20 and to receive video data representing a frame of a video image from either input A-D 14 or from a multiple frame image store implemented as a magnetic disk drive store 24 in the preferred embodiment but which can be any bulk storage memory device in other embodiments. Frame store 22 is a random access store that is capable of storing more data than is required for a single video image frame.

The storage capacity provided by presently available 64K memory chips enables storing up to 750 lines of video data. In any event, out of a 525 line NTSC frame of data only about 484 lines represent video data. Because of the two dimensional nature of a video image a quarter size image defined by video data having one-fourth the spatial resolution of a full size image requires one-sixteenth the storage capacity of a full size, full spatial resolution image. A quarter resolution image thus requires the equivalent storage of 30 lines of a full resolution image. In any event the frame store 22 either contains initially or is expanded to contain, storage of video data representing a full resolution full size image, as well as a quarter resolution copy thereof.

A size reducer 26 is connected to be controlled by data from CPU 16 received over the system bus 20. Size reducer 26 is operable to receive video data from frame store 22 to convert the video data to a quarter spatial resolution copy thereof, and communicate the quarter resolution copy back to frame store 22 for storage therein. In a similar fashion, when video data received from disk store 24 does not contain a corresponding quarter spatial resolution copy, size reducer 26 may be employed to generate a quarter spatial resolution copy for subsequent transfer to either frame store 22 or disk store 24. Hence, any time frame store 22 receives a video image frame that does not have a corresponding quarter resolution copy, the size reducer 26 may be used to make such a copy.

As a new frame of video data is transferred from frame store 22 to disk store 24 for more permanent storage, both the full resolution and the quarter resolution copy are transferred. Since the quarter resolution copy is represented by only one-sixteenth the data of a full resolution copy, the communication and storage of the quarter resolution copy imposes only a small burden on both system operating time and extra storage space requirement within disk store 24. It should be noted that disk store 24 is a general purpose magnetic disk storage device as is commonly used in connection with general purpose digital computing systems.

During system 10 operation frame store 22 repetitively accesses stored video data to generate a continuous stream of output video data frames representing the stored image. An output digital-to-analog converter 28 receives this digital output data and converts it to an analog video signal which is subsequently supplied to output processor 32. Output processor 32 is a conventional video signal output processor, for forming a television signal in a standard format, which can be used to drive a monitor 30 for viewing of the output video image by a system monitor. The analog video signal form may also be communicated to studio equipment for further use, broadcasting or storage.

When operating in a first, normal broadcast mode, frame store 22 receives a full resolution frame of video data from disk store 24 and outputs a continuous television image in digital data form in response thereto.

In a second, editing or browsing mode, CPU 16 commands disk store 24 to output reduced resolution image data which is selectively positioned in frame store 22 for viewing in one of 16 reduced size image positions in a 4×4 array as a mosaic which fits within a normal full size image. Under operator control, the 16 viewable images may be taken sequentially from disk store 24 starting with a selected image frame. This mode is useful when scanning all of the images stored by disk store 24. Alternatively, the 16 images may be taken randomly from a list of stored images developed by the operator. This mode is especially useful when it is desired to compare certain images.

The 16 image assembly time is greatly reduced because only an amount of data equivalent to one full size, full spatial resolution, image need be transferred from disk store 24 to define all 16 images. This is only one-sixteenth of the time that would conventionally be required.

While there has been shown and described above, a particular arrangement of an electronic still store system which can rapidly compose a multiple image frame of data, for the purpose of enabling a person skilled in the art to make and use the invention, it will be appreci-

ated that the invention is not limited thereto. Accordingly, any modifications, variations or equivalent arrangements within the scope of the attached claims should be considered to be within the scope of the invention.

What is claimed is:

1. An electronic still store system comprising:

an image store means for retrievably storing therein a plurality of image frame copies of video frames, the image frame copies comprising data representing full spatial resolution images and corresponding data representing reduced spatial resolution images of the video frames;

frame store means for receiving and storing in a first mode one of said full spatial resolution images from said image store means and for repetitively generating a full spatial resolution image output, and in a second mode for receiving from the image store means and storing a plurality of said reduced spatial resolution images each at selectively located different positions, the frame store means in the second mode further repetitively generating an image output comprising the stored plurality of said reduced spatial resolution images; and

size reducer means for receiving from the frame store means the stored full spatial resolution image and in response thereto returning to the frame store means a corresponding reduced spatial resolution image, wherein the frame store means receives and stores the returned reduced spatial resolution image while continuing to store the stored full spatial resolution image.

2. The electronic still store system according to claim 1, wherein the reduced spatial resolution images each have a spatial resolution of one-fourth the spatial resolution of the corresponding full spatial resolution image.

3. The electronic still store system according to claim 1, wherein said frame store means includes a central processing unit, controlled by an operator in said first mode for selecting which of said full spatial resolution images stored in said image store means is to be retrieved from the image store means, and in said second mode for selecting which of said reduced spatial resolution images stored in said image store means are to be retrieved and stored in said frame store means, and further for selecting the different positions within a video frame at which each of said retrieved reduced spatial resolution images is stored.

4. The electronic still store system according to claim 3, wherein said frame store means further comprises an output digital-to-analog converter coupled to receive output image data from the frame store means and in response thereto to generate an analog video signal representing an output image; and

a monitor coupled to receive the analog video signal and display the output image represented thereby.

5. The electronic still store system according to claim 4, further comprising a video input means for generating an input analog video signal representing an input video image and an analog-to-digital converter coupled between the video input means and the frame store means for converting the input analog video signal to a digital form such that digital data representing said input video image is received and stored by the frame store means.

6. A video still store system comprising:

external source means for supplying a full size image data set representing a full size image frame;

a size reducer coupled to receive the full size image data set for producing therefrom a reduced size image data set representing a corresponding reduced size image frame:

an image store for storing a plurality of full size image data sets representing a plurality of full size image frames and for storing a plurality of reduced size image data sets representing a plurality of reduced size image frames, each of said reduced size image data sets corresponding to one of said full size image data sets; and

frame store means for storing one of said full size image data sets from either the external source or said image store, wherein if said image store does not supply a corresponding reduced size image data set, said frame store outputs a copy of said full size image data set to said size reducer, and receives in turn a corresponding reduced size image data set;

wherein said image store stores the reduced size image data set along with the previously stored corresponding full size image data set.

7. An apparatus for storing video pixel data representing video images of a first resolution and, for each each of the images at said first resolution, a corresponding video image at a second resolution, comprising:

random access memory means for storing video pixel data representing one of a succession of full size images at said first resolution and a corresponding reduced size version thereof at said second resolution;

bulk memory means for receiving said video pixel data from said random access memory means and for storing said succession of full size images and the corresponding reduced size versions thereof, and for outputting upon a user's command, either a selected one of the successive full size images or selected ones of the corresponding reduced size versions thereof for direct transfer to, and storage back in, said random access memory means; and

means responsive to said random access memory means for selectively generating one of said corresponding reduced size versions from the respective full size image in said random access memory means, and for transferring the video pixel data representing and the corresponding reduced size version back to the contents of said random access memory means.

8. An apparatus for storing video pixel data as at least one full size image at a first resolution, and at least one reduced size image thereof at a second lower resolution, comprising:

random access memory means having an input port and an output port, for storing the video pixel data presented at the input port;

said video pixel data representing the full size video image at a first resolution being stored in a first group of memory locations in said random access memory means;

bulk storage memory for also storing the video pixel data and for presenting selected groups of video data at said input port for storage by said random access memory means;

size reducing means responsive to said random access memory means for directly receiving said video pixel data stored in said random access memory means representing said full size image at said first resolution, and for reducing said image to the re-

duced size image at the second lower resolution, and for supplying said reduced size image at said second resolution directly back to said random access memory means in a second group of memory locations therein;

control means coupled to said random access memory means, to said bulk storage memory and to said size reducing means, for causing said size reducing means to generate said reduced size image at said second resolution and to supply same to said random access memory means in said second group of memory locations; and

said control means further causing the transfer of the full size and reduced size video pixel data from said random access memory means to said bulk storage memory for storage, and for causing the selective transfer from said bulk storage memory directly into said random access memory means of either said full size image at said first resolution or said reduced size image at said second lower resolution.

9. The apparatus of claim 8 wherein said size reducing means produces said reduced size image at said second resolution with one fourth the spatial resolution of said full size image at said first resolution, and wherein said control means determines the transfer of said reduced size image at said second resolution into said random access memory means for storage at a selected one of 16 predetermined groups of said memory locations.

10. A system for storing video data representing video images which are displayable as rasters of vertically distributed horizontal lines, each represented video image normally occupying a raster of selected vertical and horizontal size, the system comprising:

a video image size reducer having an input for receiving video data representing a video image corresponding to the selected raster size and for generating video data representing a reproduction of said video image at a selected fractional-size of said selected raster size;

a first store for receiving video data for storage and for providing video data therefrom, said first store having a capacity for storing the video data representing the video image corresponding to the selected raster size simultaneously together with the video data supplied by said video image size reducer representing said reproduction of the video image at the selected fractional-size;

a second store for receiving and storing the video data stored in the first store and for providing video data therefrom directly to the first store, said second store further storing video data representing a plurality of additional video images each corresponding to the selected raster size, and video data representing a plurality of additional reproductions at the selected fractional size of said selected raster size; and

means for selectively transferring from said second store directly to said first store either video data representing of the plurality of video images corresponding to the selected raster size, or video data representing a plurality of reproductions at the selected fractional-size of said selected raster size.

11. A method of storing video pixel data comprising:

receiving and storing in selected storage locations in a random access memory, full video pixel data comprising a full size image;

generating from the full video pixel data, reduced video pixel data representing a reproduction thereof in the form of a reduced size image at a lower resolution;

storing the reduced video pixel data representing the reduced size image in additional storage locations in said random access memory along with the full video pixel data;

storing both the full size image and the reduced size image in bulk storage memory; and

selectively transferring either the full size image or the reduced size image from said bulk storage memory into said random access memory for further processing.

12. A video still store system comprising:

an external source for supplying a plurality of full size image data sets representative of corresponding full size images;

an image store for storing said full size image data sets, and for storing a like plurality of reduced size image data sets representing a plurality of reduced size images, each of said reduced size image data sets corresponding to one of the full size image data sets;

a memory for simultaneous storage of one of said full size image data sets and a corresponding one of said reduced size image data sets;

a size reducer means for receiving from said memory the stored one of said full size image data sets, and for producing and returning to said memory the corresponding one of said reduced size image data sets;

said memory being responsive to either the external source or the image store for storing said one of said full size image data sets, and for supplying to the image store both the stored one of said full size image data sets and the corresponding one of said reduced size image data sets;

said memory being responsive to the image store to store at different selected locations the plurality of reduced size image data sets;

said memory further supplying as an output image either the plurality of reduced size image data sets arranged at different locations within the output image, or the full size image data set; and

means responsive to said memory for displaying the output image as a raster scanned video display.

13. A method of storing video pixel data for access and display comprising:

providing data sets for a plurality of full size images at a first spatial resolution;

generating, from the data sets of the full size images, second data sets representing a corresponding plurality of reduced size reproduction images at a second lower spatial resolution;

storing both the data sets of the plurality of full size images and the data sets of the corresponding plurality of reduced size reproduction images in respective selected groups of storage location; and

selectively accessing from the storage locations a data, set representing one of the plurality of full size images, and a data set representing one of the corresponding plurality of the reduced size reproduction images, simultaneously.

14. An apparatus for storing video pixel data as at least one full size image at a first resolution, and at least one reduced size image thereof at a second lower resolution, comprising:

random access memory means having an input port and an output port, for storing the video pixel data presented at the input port;

said video pixel data representing the full size video image at a first resolution being stored in a first group of memory locations in said random access memory means;

bulk storage memory for also storing the video pixel data and for presenting selected groups of video data at said input port for storage by said random access memory means;

size reducing means responsive to said random access memory means for receiving said video pixel data stored in said random access memory means representing said full size image at said first resolution, and for producing reduced size pixel data representing the reduced size image at the second lower resolution, and for supplying said reduced size image at said second resolution to said random access memory means in a second group of memory locations therein;

control means coupled to said random access memory means, to said bulk storage memory and to said size reducing means, for causing said size reducing means to generate said reduced size image at said second resolution and to supply said reduced image to said random access memory means in said second group of memory locations;

said control means further causing the transfer of the full size and reduced size video pixel data from said random access memory means to said bulk storage memory for storage, and for causing the selective transfer from said bulk storage memory into said random access memory means of either said full size image at said first resolution or said reduced size image at said second lower resolution; and

wherein said control means also determines the selective transfer of said reduced size image at said second resolution from said size reducing means into said bulk storage memory via the random access memory means.

15. A method of storing video pixel data for access and display comprising:

providing data sets for a plurality of full size image at a first spatial resolution, wherein each one of the full size images occupies upon display a raster of selected vertical and horizontal size;

generating, from the data sets of the full size images, second data sets representing a corresponding plurality of reduced size reproduction images at a second lower spatial resolution;

storing both the data sets of the plurality of full size images and the data sets of the corresponding plurality of reduced size reproduction images in respective selected groups of storage locations;

selectively accessing from the storage locations a data set of one of the plurality of full size images, and one of the sets of the corresponding plurality of the reduced size reproduction images simultaneously;

wherein the step of accessing further includes, retrieving a plurality of reproduction images, storing the retrieved plurality of images in a random access memory, and outputting the stored plurality of retrieved images as a mosaic of reproduction images occupying a raster of the selected vertical and horizontal size.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 4,821,121
DATED : April 11, 1989
INVENTOR(S) : Daniel A. Beaulier

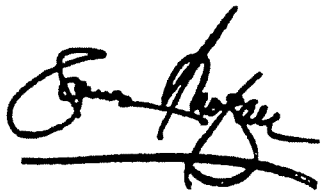
It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 6,
Line 46, please delete "and"

Column 8,
Line 61, please delete ","

Signed and Sealed this

Fourth Day of March, 2003



JAMES E. ROGAN
Director of the United States Patent and Trademark Office


U.S. DEPARTMENT OF COMMERCE
PATENT & TRADEMARK OFFICE

TAB B

IW 1167847

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May 28, 2004

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS OF:

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018786	APR 11 1989	4821121

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMI
07/018,786	02/24/87	358		262	

APPLICANTS

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CONTINUING DATA********

VERIFIED

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THIS APPLN IS A CON OF 06/740,297 05/31/85, now abandoned,

WHICH IS A CON OF 06/483,327 04/08/83, now abandoned.

FOREIGN/PCT APPLICATIONS********

VERIFIED

DV

FOREIGN FILING LICENSE GRANTED 04/06/87

Foreign priority claimed	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
35 USC 119 conditions met ☐ yes ☒ no	→	CA	1	19	9	$ 544.00	AV-3033M1
Verified and Acknowledged Examiner's Initials							

ADDRESS

RICHARD T. LAUCE
AMPEX CORPORATION
401 BROADWAY, MS 3-35
REDWOOD CITY, CA 94063

TITLE

ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

U.S. DEPT. of COMM.-Pat. & TM Office — PTO-436L (rev. 10-78)

PARTS OF APPLICATION FILED SEPARATELY

NOTICE OF ALLOWANCE MAILED	PREPARED FOR ISSUE 11-3-88	CLAIMS ALLOWED
	David E Harvey (Assistant Examiner) Nancy Noland (Docket Clerk)	Total Claims: 15 Print Claim: 13

ISSUE FEE			DRAWING		
Amount Due	Date Paid	25	Sheets Drwg.	Figs. Drwg.	Print Fig.
560.00	1/9/89		1	1	The figure

EDWARD L. COLES, SR. ML
PRIMARY EXAMINER
ART UNIT 262
Primary Examiner

LN

Label Area

ISSUE CLASSIFICATION		ISSUE BATCH NUMBER
Class	Subclass	N77
358	160	

WARNING: The information disclosed herein may be restricted. Unauthorized disclosure may be prohibited by the United States Code Title 35, Sections 122, 181 and 368. Possession outside the U.S. Patent & Trademark Office is restricted to authorized employees and contractors only.

Form PTO-436A (Rev. 9/86)

JUMBO UTILITY

Form PTO-436A
(Rev. 8/78)

SERIAL NUMBER series of 1979	PATENT DATE	PATENT NUMBER
740297		

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
06/740,297	05/31/85	358	160	262	

APPLICANTS

DANIEL A. BEAULIER, MENLO PARK, CA.

CONTINUING DATA********
VERIFIED THIS APPLN IS A CON OF 06/483,327 04/08/83
DH

FOREIGN/PCT APPLICATIONS********
VERIFIED None
DH

FOREIGN FILING LICENSE GRANTED 06/12/85

Foreign priority claimed / 35 USC 119 conditions met / Verified and Acknowledged	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐ yes ☑ no / ☐ yes ☒ no / DH (Examiner's Initials)	→	CA	1	20	3	$ 300.00	AV-3033K1

ADDRESS

AMPEX CORP.
401 BROADWAY, MS 3-35
REDWOOD CITY, CA 94063-3199

TITLE

ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

U.S. DEPT. of COMM.-Pat. & TM Office — PTO-436L (rev. 10-78)

PARTS OF APPLICATION FILED SEPARATELY

PREPARED FOR ISSUE

(Assistant Examiner) (Docket Clerk)

AT ALLOWANCE

SHEETS DRWGS	FIGURES DRWGS	CLAIMS	CLASS	SUBCLASS

EXAMINED AND PASSED FOR ISSUE

(Primary Examiner) (Group)

Estimate of printed pages | Issue fee due (est.)

Drawings: Sheets:

Notice of allowance and issue fee due (est.)

Date mailed Date paid

RETENTION LABEL

REGULAR UT [redacted] **NOT**

Form PTO-436
(Rev. 8/78)

SERIAL NUMBER (series of 1979): 48332 [redacted] Class 360 — PATENT

SERIAL NUMBER	FILING DATE	CLASS	SUBCLASS	GROUP ART UNIT	EXAMINER
06/483,327	04/08/83	358	160 +	233 ~~232~~ 262	~~[illegible]~~ Attorney

APPLICANTS: DANIEL A. BEAULIER, MENLO PARK, CA.

CONTINUING DATA********
VERIFIED None
DH

FOREIGN/PCT APPLICATIONS********
VERIFIED None
DH

FOREIGN FILING LICENSE GRANTED 07/11/83

Foreign priority claimed / 35 USC 119 conditions met / Verified and Acknowledged	AS FILED	STATE OR COUNTRY	SHEETS DRWGS.	TOTAL CLAIMS	INDEP. CLAIMS	FILING FEE RECEIVED	ATTORNEY'S DOCKET NO.
☐yes ☐no / ☐yes ☐no / Examiner's Initials DH		CA	1	14	6	$ 490.00	AV-3033

ADDRESS:
PATENT DEPT.
AMPEX CORP.
401 BROADWAY, M.S. 3-35
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TITLE: ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

U.S. DEPT. of COMM.-Pat. & TM Office — PTO-436L (rev. 10-78)

OR mm

PARTS OF APPLICATION FILED SEPARATELY

AT ALLOWANCE

SHEETS DRWGS.	FIGURES DRWGS.	CLAIMS	CLASS	SUBCLASS

RETENTION LABEL

PREPARED FOR ISSUE

(Assistant Examiner) (Docket Clerk)

EXAMINED AND PASSED FOR ISSUE

(Primary Examiner) (Art Unit)

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Drawing(s) | Spec(s)

Notice of allowance and issue fee due (est.)

Date mailed | Date paid

PAPER NO.
3

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

SERIAL NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO.
06/483,327	04/08/83	BEAULIER D	AV-3033

PATENT DEPT.
AMPEX CORP.
401 BROADWAY, M.S. 3-35
REDWOOD CITY, CA 94063

EXAMINER	
HARVEY, D	
ART UNIT	PAPER NUMBER
262	3

DATE MAILED: 12/21/84

This is a communication from the examiner in charge of your application.

COMMISSIONER OF PATENTS AND TRADEMARKS

☒ This application has been examined ☐ Responsive to communication filed on _____ ☐ This action is made final.

A shortened statutory period for response to this action is set to expire 3 (three) month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. ☒ Notice of References Cited by Examiner, PTO-892.
2. ☐ Notice re Patent Drawing, PTO-948.
3. ☐ Notice of Art Cited by Applicant, PTO-1449
4. ☐ Notice of Informal Patent Application, Form PTO-152
5. ☐ Information on How to Effect Drawing Changes, PTO-1474
6. ☐ _____

Part II SUMMARY OF ACTION

1. ☒ Claims 1 - 14 are pending in the application.
   Of the above, claims _____ are withdrawn from consideration.
2. ☐ Claims _____ have been cancelled.
3. ☐ Claims _____ are allowed.
4. ☒ Claims 1 - 14 are rejected.
5. ☐ Claims _____ are objected to.
6. ☐ Claims _____ are subject to restriction or election requirement.
7. ☐ This application has been filed with informal drawings which are acceptable for examination purposes until such time as allowable subject matter is indicated.
8. ☐ Allowable subject matter having been indicated, formal drawings are required in response to this Office action.
9. ☐ The corrected or substitute drawings have been received on _____. These drawings are ☐ acceptable; ☐ not acceptable (see explanation).
10. ☐ The ☐ proposed drawing correction and/or the ☐ proposed additional or substitute sheet(s) of drawings, filed on _____, has (have) been ☐ approved by the examiner. ☐ disapproved by the examiner (see explanation).
11. ☐ The proposed drawing correction, filed _____, has been ☐ approved. ☐ disapproved (see explanation). However, the Patent and Trademark Office no longer makes drawing changes. It is now applicant's responsibility to ensure that the drawings are corrected. Corrections MUST be effected in accordance with the instructions set forth on the attached letter "INFORMATION ON HOW TO EFFECT DRAWING CHANGES", PTO-1474.
12. ☐ Acknowledgment is made of the claim for priority under 35 U.S.C. 119. The certified copy has ☐ been received ☐ not been received ☐ been filed in parent application, serial no. _____; filed on _____.
13. ☐ Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.
14. ☐ Other

PTOL-326 (Rev. 7-82) EXAMINER'S ACTION

1. Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

The claimed invention deals with the storage, retrieval, and size reduction of still video images. The apparent novelty of the claimed system is that a "stored video frame", corresponding to a given video image, includes a full resolution and a quarter resolution copy of the said video image. This definition of "frame" seems to be made on page 7, lines 7-10, of the disclosure where it is stated, "as a new frame of video data is transferred from the frame store 22 to the disk store 24 for more permanent storage, both the full resolution and quarter resolution copy are transferred." Thus "frame" is interpreted, as described in the disclosure, to define a frame of data which incudes both a full and a quarter resolution copy of a given image.

The use of "frames" in claim 1, lines 3-5, is indefinite. It is not clear whether "frames of video images" refers to either full resolution frames or quarter resolution frames or to frames which contain both a full and a quarter resolution copy.

In claim 1, lines 8-15, and in claims 2, 3, 6 and 7 the use of the term "frame" is also indefinite. It becomes very confusing when "frame" seems to describe two different techniques of data storage. In the first case, "frame" seems to refer to data which contains both resolution copies and in the next case it seems to refer to separate full and reduced resolution "frames".

In claim 1, line 7, the use of "receive" is indefinite. The claim does not clearly state what is being received.

In claim 4, lines 4-5, the use of "frame store" seems to be incorrect. The claim implies that image copies are retrieved from the frame store and then stored back in the same frame store at a different location.

In claim 4, line 6, and in claim 5, lines 5-7, the use of the terms "image copy" and "image" is indefinite when referred back to the problems as stated for claim 1. The distinction among "frames", "images" and "image copies" has not been clearly defined.

The applicant is also asked to make sure that all of the terms used in the claims have antecedent basis, where needed, when correcting the problems as stated above.

2. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 and 3-14 are rejected under 35 U.S.C. 103 as being unpatentable over the publication by Hugh, Boyd, Quantel.

The apparent novelty of the claimed invention as disclosed seem to be as follows:

1) each stored "frame" of video data contains both a full and a quarter resolution copy of the image;

2) size reduction and production of the "frame" of video data is performed by the interaction between the size reducer and the frame store prior to storage in the image storage;

3) and the "frame" of video, containing both resolution copies, is non-selectively produced for all images that are stored.

The above claims do not clearly describe the apparent novelties of the claimed invention. Thus the claims are broad enough to read upon the "Quantel DLS6000" as described by Hugh Boyd. This system stores a plurality of still frames on disk memory (image memory). These "full resolution" frames can be copied out of memory, reduced in size, and placed in any desired position of a "frame store." (Pg. 47; column 1; lines 11-19). These reduced resolution images can then be stored back on disk memory (Pg. 47, column 3; lines 18-25). Thus the disc store can contain a plurality of frames with full and reduced resolution copies. The "frame store" can also hold either copy and can position the reduced copies in the store as desired for output.

4. Any inquiry concerning the merits of this office action or earlier communications from the exa-

miner should be directed to David E. Harvey whose telephone number is (703) 557-6844. Any inquiry of a general nature of relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 557-3321.

DE Harvey:klw DH
12-17-84
(703) 557-6844

JOHN C. MARTIN
SUPERVISORY PATENT EXAMINER
GROUP 260

TO SEPARATE, HOLD TOP AND BOTTOM EDGES, SNAP–APART AND DISCARD CARBON

FORM PTO-892 (REV. 3-78) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

NOTICE OF REFERENCES CITED

SERIAL NO.	GROUP ART UNIT	ATTACHMENT TO PAPER NUMBER
06/483327	262	3

APPLICANT(S): Beaulier

U.S. PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	NAME	CLASS	SUB-CLASS	FILING DATE IF APPROPRIATE
	A	4152722	5/1/79	Inuiya et al.	358	102	
	B	4302776	11/24/81	Taylor et al.	358	160	
	C						
	D						
	E						
	F						
	G						
	H						
	I						
	J						
	K						

FOREIGN PATENT DOCUMENTS

*		DOCUMENT NO.	DATE	COUNTRY	NAME	CLASS	SUB-CLASS	PERTINENT SHTS. DWG	PERTINENT PP. SPEC.
	L								
	M								
	N								
	O								
	P								
	Q								

OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, Etc.)

R Hugh Boyd, "The DL56000 – A New Digital Still Store Library System" International Broadcast Engineer, Vol. 11, No 170, pp 46-48 3/80 (360/35,1)

S

T

U

EXAMINER	DATE
David E Harvey	12/4/84

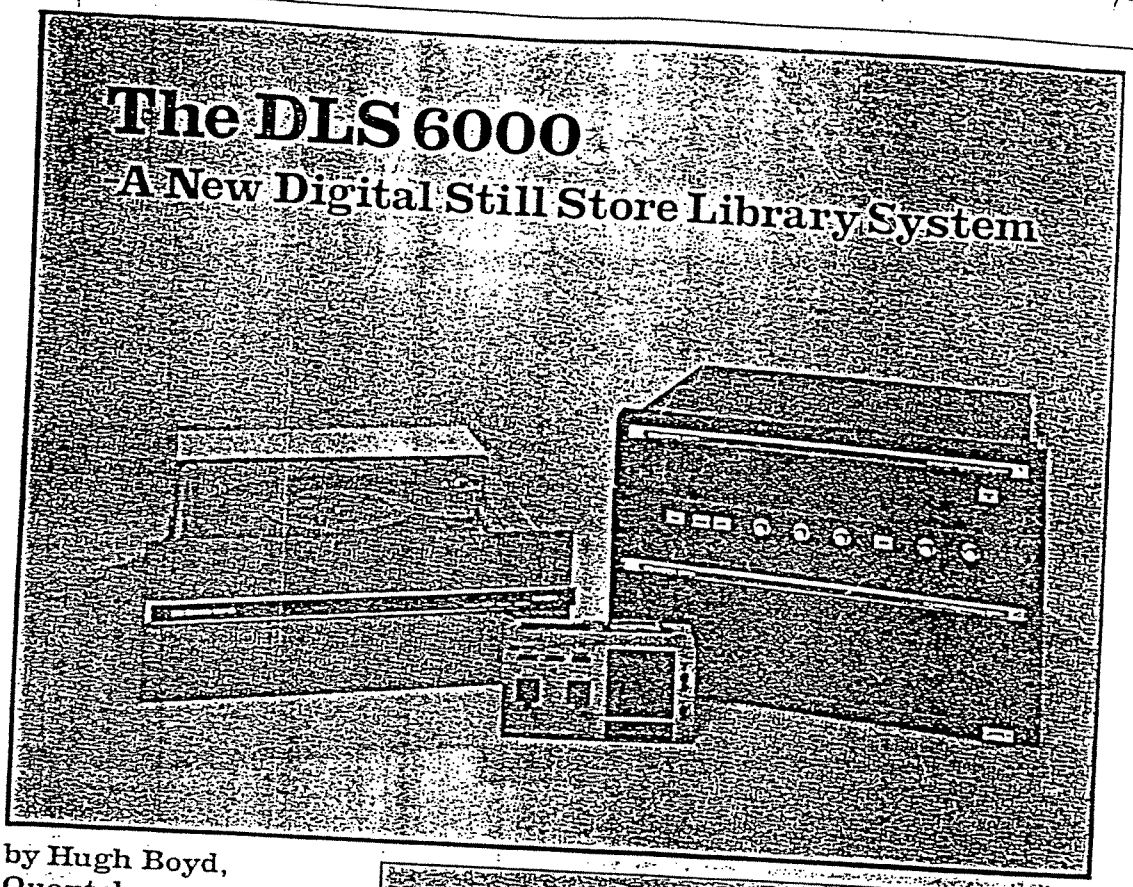
* A copy of this reference is not being furnished with this office action. (See Manual of Patent Examining Procedure, section 707.05 (a).)

360 - 5.1

S0466 0079

The DLS 6000

A New Digital Still Store Library System



by Hugh Boyd, Quantel.

The Quantel DLS 6000 Digital Library System was first introduced to broadcasters at private demonstrations held during last year's NAB and Montreux exhibitions. At that time, the product was still under development, and Quantel were seeking comments from their invited guests as to the final configuration of the DLS 6000. The proferred advice was considered sufficiently valuable by Quantel engineers for some of it to be included in the ultimate system design, which will be demonstrated publicly for the first time at NAB 1980.

The DLS 6000 represents a new generation of still stores for television broadcasting. The system provides not only significant improvements in basic performance over existing techniques, it also offers several unique facilities that make the unit a complete production tool. At only 10.5 inches high for the DLS 6000, and 7 inches high for the storage disc unit, the system is ideally suited for OB van use as well as in the studio.

The Digital Library System is a naturally evolutionary product to come from the Quantel stable. It is revolutionary in concept and is based on a solidly engineered, flexible piece of hardware utilising three framestores and a DEC LSI-11 minicomputer. Typically, the DLS 6000 embodies

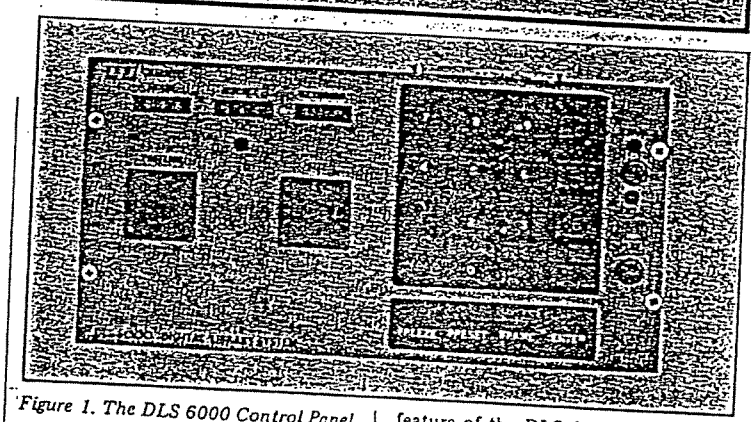


Figure 1. The DLS 6000 Control Panel

Quantel's basic principle of expandability by retrofitting new options as they become available. The word "obsolete" does not exist in the Quantel vocabulary!

Infinite Storage Capacity

The disc unit has a picture capacity of up to 340 stills. With multiple disc operation, say ten discs, 3400 pictures would be randomly accessible. However, the number of discs allowed is wisely unlimited, but is is anticipated that broadcasters requiring very large library storage will avail themselves of a video tape back-up store — a unique feature of the DLS 6000. Because the data is transferred in digital form, there is no loss of quality. Picture information can be transferred automatically from disc to a standard video cassette or reel-to-reel machine without it being modified, whether it is in use in a studio or OB van.

Transfers from tape to disc work in exactly the same way, therefore a cassette is all that is required to move information between locations. Similarly, a full archival store library can be formed from cassette or tape with more than 3000 pictures being stored on one tape. Again, being digital in format, no generation losses are seen no matter how many times the information is recorded or re-recorded.

INTERNATIONAL BROADCAST ENGINEER (GB) Vol. 11, no. 170 (Mar. 1980)

WSC 355 - 128 XR 360 - 35

Production Effects Capability

The provision of a number of production effects seems to be a logical facility for a Quantel framestore-based product. The DLS 6000 has this integral feature for very practical reasons.

Picture repositioning is achieved by the simple movement of a joystick on the compact 8" x 4" control panel (Figure 1).

Picture compression is also achieved by moving a joystick. The stored image may be reduced to any size between normal (full frame) and virtually zero size. This feature, when used with repositioning, defines the exact size and position of a still without employing any other digital effects system.

Picture enlargement. Joystick movement enlarges the image up to two times to allow selection of a chosen portion of a still.

Variable aspect ratio. The aspect ratio of the image can be varied from the normal 4 x 3 to any rectangular shape.

Multiple picture handling. The DLS 6000 is capable of reproducing as many pictures as are wanted at the same time. This facility is clearly an adjunct to compression and repositioning. It is used either to show, at the same time, a number of participants in a discussion or event, or even to build up a complete montage of images. The pictures can be called down from the disc one at a time to show the viewer the build up, or can be called simultaneously so that only the finished composite is broadcast.

Borders. The DLS 6000 is equipped with its own border generator capable of changes in hue, saturation, luminance and width. Borders can be placed around all pictures being shown if desired, although different images can have quite different border parameters at the same time. The border generator also includes a background or matte generator, further releasing the mixer for other functions.

Extensive Operating Features

Both the technical director and the system operator were kept very much in mind by Quantel when designing the Digital Library System. Each has a computer display panel, with the director's being associated with the mixer and almost always used for replay. Whereas, the panel the operator (or "composer") uses, will be essentially employed for recording. The DLS 6000 is capable of single or two person operation, so two control panels may access the machine simultaneously for *time sharing*.

High change rate. Pictures can be changed at a rate of two per second with complete random access. Thus, no cache memory of the day's programme requirement has to be prepared.

On-air picture change. Although the change rate is limited to two per second, the additional framestore circuitry in the DLS 6000 allows vertical interval switching between pictures. The switch is instantaneous: only the throughput rate is limited to two per second.

On-air transitions. When using the DLS 6000, a mix/effect bus can be eliminated by utilising the digital transitions available in the unit. Changes between one picture and the next can be by means of a simple cut, a programmable dissolve, or even a wipe.

Multiple outputs. Three outputs are available with the DLS 6000 — two programme and one preview. Internally generated transitions are possible with both programme outputs, or they can be used together to utilise more exotic wipes in a mixer. Keys are generated by the system to match the picture at all times.

Preview. The DLS 6000 has its own preview output which can be operated without affecting the on-air programme or transitions. The preview allows the varying sizes or positions of images to be chosen by means of cross wires controlled by joysticks, and also contains the fast viewing or "browse" feature.

Browse. The preview facility has the ability to look through the contents of the disc by displaying 25 images at a time, and slowly moving them down the screen. This rolling list of pictures allows easy viewing to find a desired frame, or alternatively, permits the showing of pre-chosen slides waiting in the "stack" for display during a programme.

On-air editing. As previously mentioned, the on-air display or transition is unaffected by previewing. Similarly, the DLS 6000 permits the capture and recording of incoming material while the equipment is being used during a broadcast. This is an essential feature to get the full benefit of the system in a news studio situation.

Asynchronous operation. The input of the Digital Library System can handle asynchronous information to allow stills to be captured from incoming ENG material.

Graphics handling. The DLS 6000 is capable of keying stored graphics over displayed images, thereby releasing the mixer from this function. Graphics may have their size and position defined quite independently of picture information, always assuring perfect readability for all sizes of titled images.

Digital re-recording of composite pictures. Composite pictures created on the preview monitor can either be stored as control parameters to ensure recall on demand on the programme outputs, or alternatively, can be re-recorded back onto disc as a complete new picture at an individual location.

Editing system. Complete sequences of commands to the DLS 6000 can be set up and stored for simple single button operation during a programme. The editing system does, however, allow simple addition or deletion of items to ensure ease of operation in a fast moving news broadcast. The minicomputer in the system will permit the addition of standard computer peripherals at a later date to accommodate even more powerful editing equipment.

Control delegation. As previously stated, the control of the DLS 6000 can be time-shared between several stations including during a live broadcast. Separate preparation and replay panels permit the technical director to remain divorced from the recording of stills from incoming ENG material.

Obviously, the basic task of the Digital Library System is to replay the correct picture from the disc store. However, the usefulness of the system is greatly enhanced by the ability to choose the size and position of the replayed picture, and to define it in accordance with the requirements of the rest of a production. The Quantel tradition of high fidelity is maintained in the quality of the images produced by the DLS 6000 at all times, whether the size of the still has been modified or not. At all sizes and shapes, the unit displays excellent image quality, with-

GROUP 123

SLIDE	PICTURE	SIZE & POSITION	BORDER	TRANSITION	CUE
0	23	NORMAL	ON	DISSOLVE	20
1	18	COMPRESS	OFF	CUT	
2	14	ENLARGE		WIPE	10
3					
4	36	COMPRESS		SUPER	INSTANT
5	100	COMPRESS		SUPER	
6	23	COMPRESS		CUT	
7					
8	11	NORMAL		CUT	EXT
9	10				

NEXT GROUP 138

Figure 2. An example of a typical Edit Display (as would appear on the TV monitor).

out showing any hint that the video has been processed.

The Control System

The philosophy behind the control system for the Digital Library System is based on the concept of Pictures, Slides and Groups. A Picture is defined as an image on disc and has a number allocated to it at the time of recording. Pictures are normally recorded on disc at full size to give maximum flexibility on replay. A Slide is a Picture on replay that has the parameters of size, position, transition type and time, etc, allocated to it. The number of a Slide need not be the same as the number of the Picture that the Slide depicts. A Group is a collection of up to ten Slides.

It is essential to appreciate that, with this machine, defining a still merely by a number is insufficient due to the extra facilities available. Therefore, both the still and what is to be done with it must be defined before displaying on the programme output. The computer display. The extra degree of freedom made available by the DLS 6000 production features, make it necessary that at both preparation time and programme time, the operator always has a clear picture of exact machine status. In order to give the user this clear indication of the situation, a video display system has been added to the host computer, and it is via this display system that all setting of parameters is achieved.

The computer display output is added to the preview output, and hence, shares the preview screen. There are three types of computer display available to the user: Edit, Ident and Menu. A cursor display is added to all these to allow the size and shape of images to be defined on the preview monitor.

A Typical example of the Edit display is shown in Figure 2. It will be seen that the Slide number is independent of the Picture number as has been described earlier.

The Ident display overlays the true Picture number when using the "browse" feature, so that the various chosen Pictures may be easily identified.

The Menu display is a special option that allows selection of modes of use of the machine, and it is this display that is used in conjunction with the tape backing store system.

The recording chain is shown at the top of Figure 3. Input video enters the system and is immediately converted into digital format and passed to a framestore at full video data-rate. This input framestore acts as a freeze frame device and allows the user to select still pictures from the incoming live video. For simplicity, the link from the output of this store to the preview output from the DLS 6000 has not been shown, but in reality, the video follows this path allowing the user to observe the incoming picture at all times, whether live or frozen.

Once the chosen image has been frozen in the framestore it is read out from the store at disc rate via a data processor section to further reduce data rates, and then via the disc formatter to block the information suitable for writing onto the disc.

The disc itself is a latest generation Winchester drive high packing density sealed unit. The heads are of the flying type, but the construction of the disc eliminates the need to have expensive and unreliable head retraction mechanism — the heads actually land on the disc surface when the platter is not in motion. The disc data rate allows a picture to be generated in 0.5 seconds. The total package is highly reliable and rugged and includes parity check circuitry for optimum data integrity.

The replay chain, shown at the bottom of Figure 3, is obviously more complex than record due to the increased number of framestores and programme output facilitites. Data from the disc passes through a disc re-formatter where the information is sorted out from its blocks, and then onto the data processor where it is unpacked. At this point, the information is passed to one of the three framestores available, and it is now that the size change mechanism operates. If the information is routed via the preview store, no other processing is done other than reading it out of the store at full video rate into a DAC and onto the display via a proc amp. If the data is fed to one of the programme stores, it is subsequently passed to a digital combiner assembly that performs the appropriate wipe, cut or dissolve functions. Also, the combiner copes with the addition of borders or the keying of caption information over pictures or coloured matte.

For convenience, one framestore is shared between the video input facility and the preview output. Not shown in Figure 3 is the host DEC LSI-11 minicomputer that controls the whole machine and is responsible for all housekeeping tasks, the operation of the control panel and the editing system.

The tape backing store system is interfaced to the disc before and after the disc formatter and de-formatter. The information on disc has to be prepared and re-blocked by the tape formatter prior to the addition of syncs and burst for feeding to the tape system. It should be remembered that the tape system is perfectly conventional, and can be any recorder available in the studio or OB van.

When receiving information from the tape backing store, information is unpacked and blocked in a tape de-formatter before being passed on to the disc. The DLC 6000 Digital Library System is available in NTSC standard. But, as usual with Quantel, it is reasonable to assume that PAL and SECAM versions are already being developed. When they are introduced, one can expect even more flexible facilities to be unveiled, and naturally, none of them will make any other part of the existing system obsolete. ■

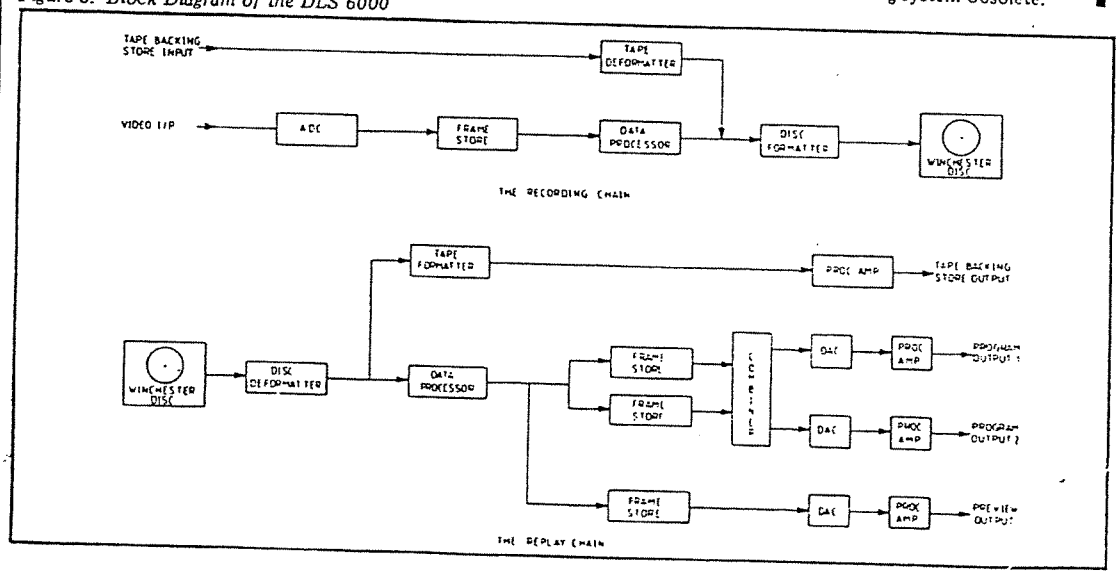


Figure 3. Block Diagram of the DLS 6000

PAPER NO.
4

Cl 262

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
DANIEL A. BEAULIER
Serial No. 483,327
Filed: April 8, 1983
Title: ELECTRONIC STILL STORE WITH HIGH SPEED SORTING AND METHOD OF OPERATION

Art Unit: 262
Examiner: D. Harvey
Attorney Docket No. AV-3033

4/a.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231, on 2-1-85

Bradley A. Perkins, Reg. # 31,406 2-1-85 DATE

Honorable Commissioner
of Patents and Trademarks
Washington, DC 20231

Sir:

AMENDMENT

In response to the first Office Action dated December 21, 1984, please amend the above-identified application as follows:

IN THE CLAIMS:

Please rewrite Claim 1 as follows:

1. (Amended) An electronic still store system comprising:

an image store for [retrievable] retrievably storing therein a plurality of frames of video images with both a full spatial resolution image frame copy and a reduced spatial resolution image frame copy of each image frame being stored; and

a frame store which is operable in a first mode to receive frames of video images from the image store and repetitively generate a full spatial resolution output image frame and operable in a second mode to receive from the image store and store a plurality of reduced spatial resolution image frames, the frame store being further operable in the second mode to repetitively generate an output image frame having an image frame from each of the plurality of reduced spatial resolution image frames selectively located at a different position within the output image frame.

Please rewrite Claim 2 as follows:

2. (Amended) An electronic still store system comprising:

an image store for retrievably storing therein a plurality of frames of video images with both a full spatial resolution image frame copy and a reduced spatial resolution image frame copy of each image frame being stored;

a frame store which is operable in a first mode to receive frames of video images from the image store and repetitively generate a full spatial resolution output image frame and operable in a second mode to receive from the image store and store a plurality of reduced spatial resolution image frames, the frame store being further operable in the second mode to repetitively generate an output image frame having an image frame from each of the plurality of reduced spatial resolution image frames selectively located at a different position within the output image frame; and [The electronic still store system according to claim 1 above, further comprising]

a size reducer coupled to receive from the frame store a full spatial resolution image frame and in response thereto to return to the frame store a reduced spatial resolution image frame and wherein the frame store is operable to receive and store the reduced spacial resolution image frame while continuing to store the full spatial resolution image frame.

Please rewrite Claim 4 as follows:

4. (Amended) The electronic still store system according to claim 1 above, further comprising a central processing unit coupled to select in response to control by an operator which image frame copies are retrieved from the [frame] image store and the location within the frame store at which each image frame copy is stored.

Please rewrite Claim 5 as follows:

5. (Amended) The electronic still store system according to claim 1 above, further comprising a central processing unit which is coupled to select in response to control by an operator to command the retrieval of a plurality of reduced spatial resolution image[s] frames from the image store and the placement of the retrieved image[s] frames as reduced size image[s] frames within an output image frame generated by the frame store.

REMARKS

The first Office Action of December 21, 1984 has been carefully considered. Reconsideration of the application, as amended, is respectfully requested.

Claims 1 through 14 are pending in this application. Claims 1, 2, 4, and 5 have been amended by being rewritten.

In Claim 1, the word "retrievable" in the second line has been changed to "retrievably" to correct a grammatical error. This change does not affect the substantive content of the claim.

Claims 1 through 8 were rejected under 35 U.S.C. 112, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

The Examiner noted that the use of "frames" in Claim 1 is indefinite. Claim 1 has been amended so that it is now clear that "frames of video images" refer to either full resolution frames or reduced resolution frames but not the combination of the two. Both the full and the reduced spatial resolution copy are now referred to as image frame copy, pointing out that both copies are considered frames separate from the other. Support for this addition can be found in the specification at least on page 2, lines 30 to 33, continuing on page 3, lines 1 to 2.

The Examiner further noted that the use of "frame" in Claims 1, 2, 3, 6, and 7 is indefinite because it is not clear whether a frame includes both the full and the reduced image, or just one of the images. In addition to the additions discussed above, the word "frame" has also been added after the word image in Claim 1. Support for this addition can also be found at the above location in the specification. These addition make it clear that a frame can be either a full or reduced spatial image but not both. This change in Claim 1 clears any indefiniteness in dependent Claims 2, 3, 6 and 7.

Claim 1 was further held to be indefinite as to what was received by use of the term "receive" in line 7. After the word "receive", on line 7, the phrase "frames of video images" has been added, thus making it clear what is being received. Support for this addition can be found in the specification at least on page 7, lines 30 to 33.

The Examiner correctly pointed out that in Claim 4, lines 4-5, the use of "frame store" is incorrect. The phrase "frame store" has been changed to "image store" and now reads correctly. Support for this correction can be found in the specification at least on page 8, lines 2 to 13.

The Examiner further noted that Claims 4 and 5 had similar problems to Claim 1 with regard to use of the term frame and image. Both claims have been amended to consistently use the term "image frame". As with amended Claim 1, this clears the indefiniteness. Support for these additions can be found in the specification at least on page 2, lines 30 to 33, continuing on page 3, lines 1 to 2.

Claim 2 has been rewritten in independent form by including all the limitations of amended Claim 1, on which it was dependent. As Claim 2 was not rejected on the basis of any prior art, it thus appears to be in condition for allowance. Claim 3 is dependent on amended Claim 2 and adds further details to amended Claim 2, and is also believed to be now in condition for allowance.

The Applicant's invention provides for an electronic still store system for storing, in an image store, both full and reduced spatial resolution images. The system has frame store where that operates in two modes. In the first mode, both a full spatial resolution image frame is received from the image store to generate an output image frame. In the second mode, a plurality of reduced spatial resolution image frames are received from the image store to generate an output image frame.

The Examiner rejected the original Claims 1, and 3 through 14 under 35 U.S.C. 103 as being unpatentable over the publication be Hugh Boyd, Quantel. Claim 3, is dependent on amended Claim 2 and, as discussed above, both are believed to be in allowable condition.

The Boyd publication discloses a system for the storage and retrieval of video image frames. A particular frame may be retrieved from the storage disk, reduced, made part of a composite frame and stored back to the disk, but the new frame stored back to the disk will be full size, although it may contain a reduced image. The Boyd publication does not teach the storing in an image store of both a full and reduced spatial resolution image frame. The Boyd publication only discloses the storing of full size images. The system disclosed in the Boyd publication does not teach retrieving a plurality of reduced spatial resolution image frames to form an output image frame without further reduction as taught be the Applicant. Hence, the Applicant respectfully submits that rewritten Claim 1 is structurally and functionally distinguishable over the Boyd publication.

Because dependent amended Claims 4 and 5 and Claims 6 through 14 add considerable further detail to the amended Claim 1 for the features discussed above, they are believed to be in condition for allowance for those self-evident additional reasons as well.

The Inuiya et al and Taylor et al references, which were cited but not applied, do not appear to be pertinent to the claims.

In the event that this amendment does not place this application fully in condition for immediate allowance for any reason, a telephone interview is respectfully requested at the number listed below.

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